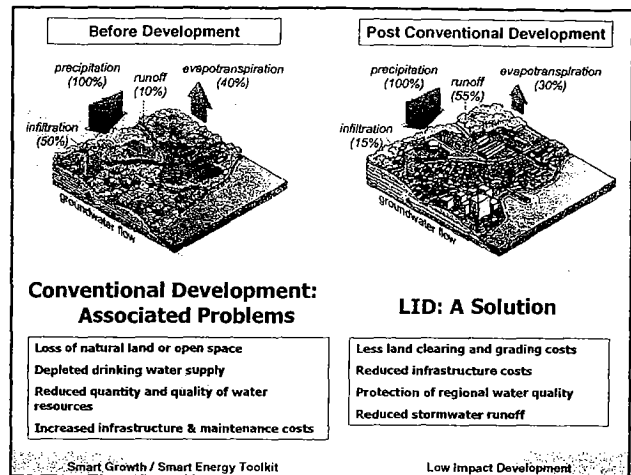


Low Impact Development LID

- * Effective Site Design
- * Natural Stormwater Management



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"Conventional" Planning & Design



- Style of suburban development over the past 50 years
- Generally involves larger lots
- Clearing and grading of significant portions of a site
- Wider streets and larger cul-de-sacs
- Enclosed drainage systems for stormwater conveyance
- Large detention ponds

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LID Site Design Planning Process



- #1 AVOID IMPACTS** – Preserve Natural Features and Use Conservation Design Techniques
- #2 REDUCE IMPACTS** – Reduce Impervious Cover
- #3 MANAGE IMPACTS** – Utilize Natural Features and Natural Low-Impact Techniques to Manage Stormwater

Low Impact Development



- Conservation of natural hydrology, trees, and vegetation
- Minimized impervious surfaces
- Dispersal of stormwater runoff
- Conservation of stream & wetland buffers
- Ecological landscaping

LID Site Design



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Low Impact Development

Site Design Practices

- Reduce storm pipes, curbs and gutters
- Preserve sensitive soils
- Cluster buildings and reduce building footprints
- Reduce road widths
- Minimize grading
- Limit lot disturbance
- Reduce impervious surfaces

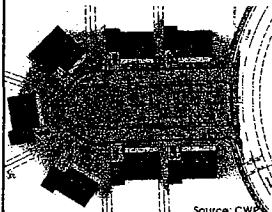


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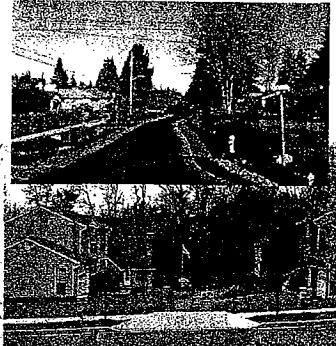
Low Impact Development

Better Site Design of Roadways and Driveways

- Narrower streets
- Alternative cul-de-sacs
- Shared driveways



Source: CWP

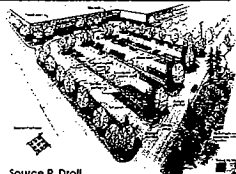


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Better Parking Lot Design

- Incorporate green strips and buffers
- Create multiple small lots
- Reduce requirements near transit
- Allow shared parking
- Require compact spaces
- Set parking maximums
- Alternative permeable pavers in overflow areas



Source: R. Droll

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Low Impact Development

Low Impact Development LID

*Natural Stormwater Management Practices

- Small-scale stormwater controls
- Distributed throughout site
- Maintain flow patterns, filter pollutants, and recreate or maintain hydrology

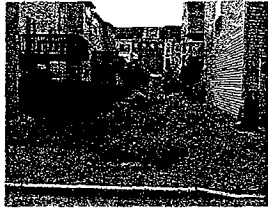


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LID Stormwater Techniques

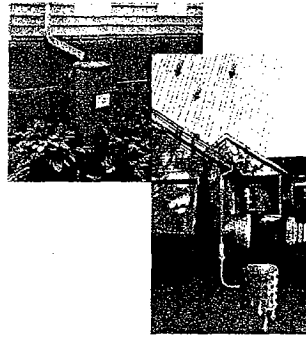
- Rain Barrels and Cisterns / Water Re-use
- Stormwater Planters, Tree Planting
- Permeable Paving
- Open Channels
- Bioretention
- Stormwater Wetlands
- Green Rooftop Systems
- Vegetative Buffers
- Infiltration



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Low Impact Development

Rain Barrels, Cisterns, & Dry Wells Runoff Reduction & Water Conservation



- Downspouts directed to tanks or barrels
- 50 -10,000 gallons
- Excess diverted to drywell or rain garden
- Landscaping, car washing, other non-potable use
- Dry well infiltration of roof runoffs

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Low Impact Development

Vegetated Swales

Conveyance, Treatment, Infiltration

- Roadside swales ("country drainage") for lower density and small-scale projects
- For small parking lots
- Mild side slopes and flat longitudinal slopes
- Provides area for snow storage & snowmelt treatment



Permeable Pavement

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Low Impact Development

Bioretention Applications

- Parking lot islands
- Median strips
- Residential lots
- Office Parks
- Urban Retrofits

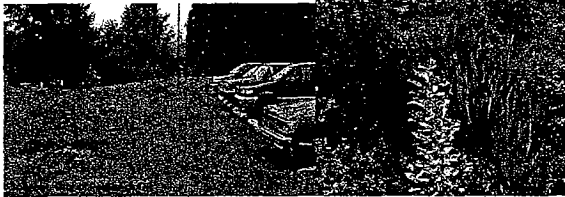


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Low Impact Development

Vegetated Filter Strips Pretreatment and Attenuation

- Mild vegetated slopes
- Adjacent to small parking lots and roadways
- Another opportunity for snow storage

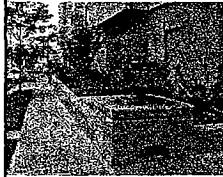


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Green Roofs

- Stormwater Runoff absorption/collection
- Interior heating and cooling benefits of 10 degrees or more
- Extended roof life, estimated at 40 years



Stormwater Planters

- Vegetative uptake of pollutants
- Pretreatment for suspended solids before they reach water-treatment facilities
- Aesthetically pleasing
- Reduction of peak discharge rate

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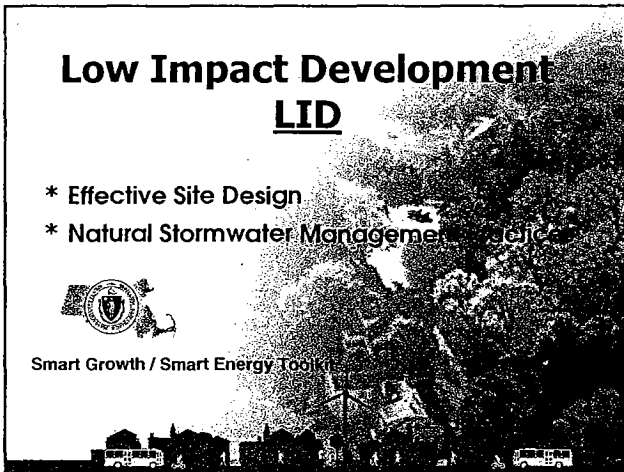
Low Impact Development

Low Impact Development LID

- * Effective Site Design
- * Natural Stormwater Management Practices



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Low Impact Development

Land Use Partnership Act Section 6D:

The plan establishes “Low-Impact Development” standards (that is standardized best management practices for preserving natural hydrology) with respect to the development of land within the municipality.

Note: As suggested this language was previously updated to require the application of LID to all development in a community [development and redevelopment projects].

1. What is Low Impact Development?

Low Impact Development (LID) is a land development strategy that emphasizes natural stormwater management practices and the protection of on-site natural features through environmentally sensitive site design. Once natural resources on the site have been assessed and the building envelope established LID techniques such as maintaining natural drainage flow paths, minimizing land clearance, clustering buildings, and reducing impervious surfaces are incorporated into the design. A series of small scale stormwater best management practices (BMPs) that preserve the natural features and hydrology of the land and manage stormwater as close to its origin as possible are used to infiltrate, store and transpire precipitation instead of the conventional methods of collecting, conveying, and piping away runoff to manage stormwater quality and quantity.

2. How does a local plan “establish LID standards”? Which LID techniques must be incorporated into local planning/permitting for a local plan to be deemed “consistent”?

- General bylaw specifically requiring/implementing LID?
- Stormwater bylaw with LID components?
- Subdivision regulations that require LID practices?

3. How can the LID standard accommodate widely varying:

- Communities: Urban Cambridge to rural Florida – varied growth rates and types as well as availability of professional staff; and
- Development Types: High density mixed use, industrial, large lot subdivision, etc.?

4. Can an acceptable statutory requirement be drafted that is not excessively prescriptive in nature - one that requires LID but lets local governments determine exactly how it is realized?

Could the statute require the use of effective site design and non-structural stormwater best management practices but let communities figure out how to incorporate these requirements into their regulatory scheme and exactly which LID techniques are appropriate?

Perhaps RPA consistency review could measure the adequacy of a set of basic LID elements like 1) submittal requirements, 2) performance standards, 3) waiver provisions, and 4) enforcement mechanisms against a set of existing standards [like the stormwater standards?] in order to determine that the community has a “functioning” LID bylaw?

For example: Communities must require a sensitive site design process that emphasizes the protection of on-site natural features and the use of decentralized systems that involve the placement of a number of small treatment and infiltration devices located close to the various impervious surfaces that generate stormwater runoff in place of a centralized system comprised of closed pipes that direct all drainage from the entire site into large detention basins.

5. Which local regulations are relevant to an LID consistency determination?

- Zoning Bylaws including those sections addressing dimensional requirement, OSRD, parking, and common driveways.
- Site Plan Requirements
- Subdivision Rules and Regulations and roadway design standards including those sections addressing street locations, street cross sections, and dead ends.
- Board of Health Bylaws and Regulations
- Wetlands Bylaws and Regulations

6. Is a different statutory requirement needed to govern LID in a redevelopment circumstance?

From the Plymouth LID Bylaw – “Redevelopment must meet the same standards as new development unless it is proven to be infeasible and a waiver is given. At a minimum existing stormwater conditions must be improved including: reduction of peak rates, reduction of discharge volume, increased recharge, and increased water quality treatment.”

7. How can LID be incorporated into local regulations in a “prompt and predictable” manner?

It will be important to find a way for both state statute and local LID requirements to be flexible enough to address the unique circumstances of a particular site yet also offer certainty and predictability.

8. Should the LID requirement apply to all development projects or is there a size or type threshold?

Perhaps some locally established level of exemption would be appropriate and could be part of the RPA consistency review?

9. Are there alternative means of realizing the goal of universal adoption of LID bylaws?

It appears that environmental laws/regulations, such as the Wetlands Protection Act or the Phase II Stormwater requirements, do not offer a ready means of requiring LID.

10. Do many communities presently require LID?

Yes. Among the dozens of communities with some type of LID requirement (the LUPA LID requirement is not yet sufficiently defined to know if communities would qualify) are Ashburnham, Belchertown, Boylston, Groton, Hamilton, Hanover, Hingham, Holden, Hubbardston, Northampton, Oxford, Paxton, Pembroke, Southborough, Topsfield, and Westminster.